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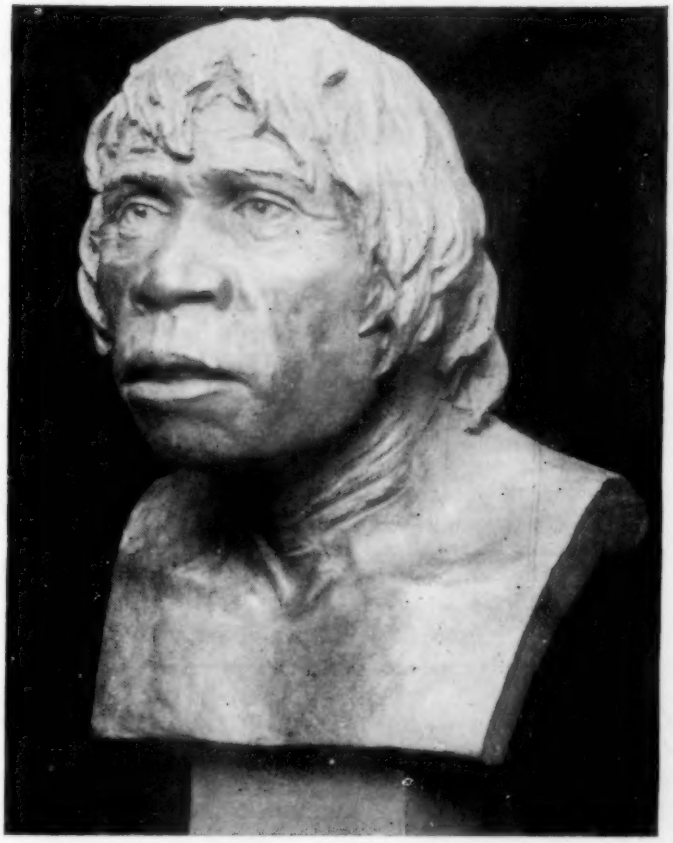

THE NEW DAWN MAN

Piltdown of Sussex Becomes Man's Earliest Ancestor

(See page 3)

Vol. XVII No. 456

Punch Here to Fit Approx. Your Loose Leaf Binder Over

Mystery of the B Stars Explained

Astronomy

Astronomers Discuss Eclipses and Sunspots

Rotation of the galaxy—the system of stars of which the sun, the milky way and all the visible stars are part—around a distant and massive center, helps explain the peculiar motions of the bluish-white stars classified as type B. This announcement was made to the astronomers at the meeting of the American Association for the Advancement of Science by Dr. J. S. Plaskett, director of the Dominion Astrophysical Observatory, at Victoria, B. C.

Dr. Plaskett explained that the stars of type B, which are classified by the lines that appear in their spectra when their light is analyzed, all are moving from or towards the sun with much smaller speed than any other spectral type. But the curious fact has been found that most are moving from the sun, as if the whole system of these stars was expanding around the sun as a center. The average speed away from us is about five kilometers (3.1 miles) per second.

Though various suggestions have been made to account for this anomaly, such as errors of measurement, Dr. Plaskett has found that most of them agree with what would be caused by a rotation of the whole stellar system.

However, this only explains the motion of the fainter B type stars. Those brighter than the 5.5 magnitude, that is, those closest to the sun, still showed such a motion, even taking into account the galactic rotation. None of the other causes suggested would explain this, he declared.

"It is inconceivable that these causes should not operate in exactly the same way and to the same degree for faint as for bright stars. To imagine any physical property of this uniform class of B stars which depends only upon the apparent brightness, or, in other words, the distance from the sun, an insignificant star in the system, and only about one thousandth as luminous as the B stars, is to carry anthropomorphic prejudices to an absurd degree," said Dr. Plaskett.

Actually, he has found, the closer ones happen to be members of a special group of B stars in the constellation Scorpio and Centaurus, which actually show an unusually high speed for stars of this type. As a result of this work, he has found that the average speed of the B type stars ranges from about 9 kilometers (5.6 miles) per second for the brighter ones to 12 kilometers (7.4 miles) per second for those fainter and more distant. Great as this speed seems, it is less than the motions of stars of any other type.

Origin of the Corona

A startling suggestion that the sun's corona, seen as bright wings around it at the time of an eclipse, may originate partly in the atmosphere of the earth was made by Dr. Harlan T. Stetson, director of the Perkins Observatory at Ohio Wesleyan University. The balance of the light, in fact, most of the corona that we see, he suggested, may be actually around the sun, but not the limited clouds of material that they have been supposed to be. The cloud that causes it, according to his hypothesis, extends throughout the whole solar system and perhaps to the other stars.

The tiny particles in this cloud shine partly by an actual reflection of sunlight, and partly by an excitation by some of the other rays from the sun. This nebulous cloud, he said, may be similar to the cloud of nebulosity that astronomical photographs reveal around the Pleiades, the cluster of faint stars seen high overhead in winter evenings. Such a cloud would also explain the zodiacal light, a faint glow seen extending above the western horizon after sunset or the eastern horizon before sunrise.

Though this cloud accounts for most of the coronal light, Dr. Stetson suggested that some of it may originate high in the earth's atmosphere, due to excitation by the sun's rays in the same way as the northern lights. This glow would be present on the side of the earth towards the sun at all times, but, of course, could only be observed at the time of an eclipse. As the rays would travel in parallel paths the lines of the glow would seem to radiate from the sun, and cause the coronal streamers actually observed.

Good Radio Coming

If you think that distant radio broadcast stations have failed to come in as well in the last two or three years as they did in the early days of radio in 1923 and 1924, despite the more powerful stations nowadays, you may be justified. Activity of the sun, as shown by large numbers of sun spots, was to blame. With a decline in the number of sun spots scheduled for the next few years, you can look forward to a time of good reception of distant stations.

Dr. Stetson made the following prediction for the future:

"Forecasting on the basis of the 15-month cycle, (*Turn to page* 14)

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Piltdown Man Earliest Human Being

Anthropology

Dr. Osborn in Presidential Address Presents New Theory

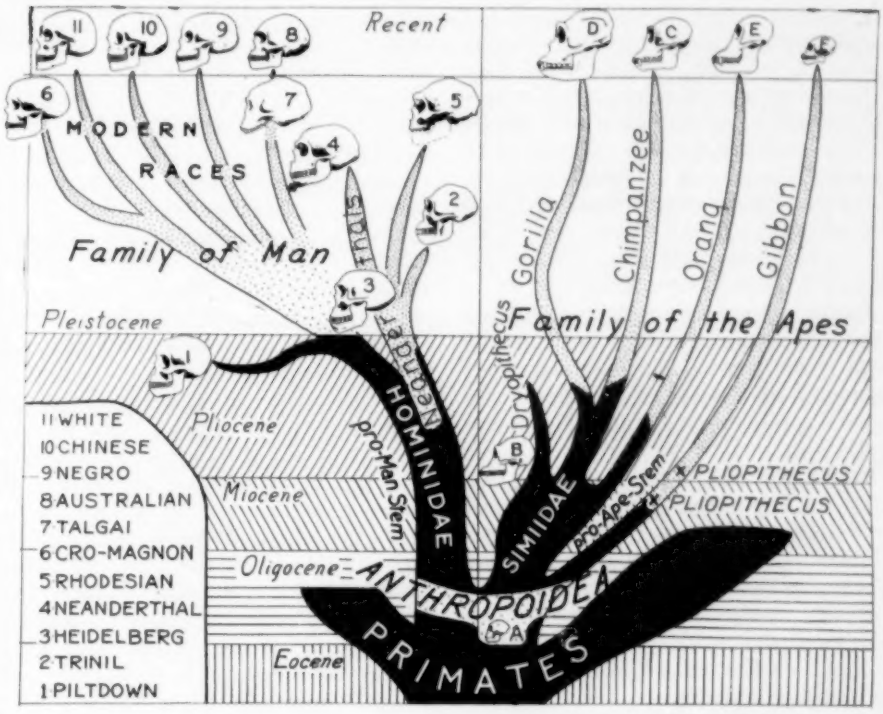
The ape-man of Darwin was read out of man's family tree and the dawn-man of Sussex, older than 1,250,000 years, was elevated to the position of man's progenitor by Dr. Henry Fairfield Osborn, president of the American Museum of Natural History, New York, one of America's leading scientists who spoke as retiring president of the American Association for the Advancement of Science at Des Moines.

A new picture was painted by Dr. Osborn of the earliest known creature who can be called human:

His size of brain was equal to the minimum of that of the living Veddahs, Papuans and native Australians, the most primitive living men. He skillfully made implements and weapons of flint and bone and for killing animals perfected a slingstone. He lived contemporaneously with a very primitive species of elephant whose remains are found from India to Africa to England and he hunted this beast for its flesh, bone and ivory. He had deft hands and fingers guided by an imaginative and intelligent forebrain. He was a nomad and long and agile lower limbs were his only means of distant transportation. He was a dweller of the open plains, not of "warm, forest-clad land" as was Darwin's "hypothetical ape" human ancestor. He lived near the end of the geological period of time known as the Tertiary, in the epoch called the upper Pliocene, which was certainly more than one and a quarter million years ago.

Eoanthropus dawsoni, the Piltdown dawn man, is his scientific name. This discovery and recognition of Tertiary man, in Dr. Osborn's opinion, "constitutes the goal and peak of biological discovery in the twentieth century."

The new idea of the Tertiary dawn man replaces the classic Darwin-Lamarck hypothesis of ape-man descent, Dr. Osborn said, and "carries us into a geologic antiquity hitherto undreamt of. Anthropology is forced to share with chemistry and physics entirely new notions of space and time. To my mind the human brain is the most marvelous and mysterious object in the whole universe and no geologic period



The family trees of man and apes, according to Dr. Osborn's latest theory.

seems too long to allow for its natural evolution."

While Dr. Osborn does differ with the Darwinian idea that an apelike creature, tree living, during the time of the great Ice Ages, was man's direct ancestor, his pronouncements strengthen the fundamental idea of natural evolution rather than the fundamentalist idea of a supernatural origin of man. While the roots of man's family tree are pushed deeper into the layers of geology and time, while the human race need not look upon apes and chimpanzees as such close cousins, nevertheless man and monkey are both offshoots from the same great stem of life, the primates. Dr. Osborn believes that their paths diverged in the time called Eocene, some thirty to forty million years ago.

Dr. Osborn's revision of human evolution makes the flint implements of Tertiary man found on the east coast of Anglia in 1909 by J. Reid Moir and the skull and jaw found at Piltdown, Sussex, England in 1911 by Charles Dawson, the oldest human relics. Pithecanthropus, the Trinil ape-man of Java, is called "a case of arrested development" not, as was formerly supposed, an ancestor. It is possible that the new finds of Peking man recently reported may strengthen Dr. Osborn's contentions.

Not all scientists will accept Dr. Osborn's idea that man had arrived at so high a state of evolution over a million years ago, and that the long ice ages gave merely the finishing touches of his development. But his presentation of a new dawn man to science will stimulate discussion and research until a better idea of the past of man will rise in man's footsteps.

Any discovery of prehistoric man must be dated by the geologic strata in which his remains are found. There must be assurance that material from a later age has not been carried into the older layers of the earth. In the case of the Piltdown Man, some anthropologists believe that he lived in the second glacial epoch but that later his bones were mingled with those of animals that lived in the earlier pliocene time.

Bacteriophage Probably Not Organism

Medicine

Discoveries in Medical Science Revealed at Meetings

A SYSTEMATIC study of the properties of bacteriophage failed to substantiate its living nature," Dr. J. Bronfenbrenner, professor of bacteriology at the Washington University School of Medicine, stated at one of the meetings in Des Moines. The evidence seems to indicate that the bacteriophage is an inanimate chemical product of bacterial metabolism, having no cell-dissolving properties of its own, Dr. Bronfenbrenner said.

Bacteriophage has been hailed as a most potent germ-killer, being made itself from germs, but ever since its discovery by Dr. F. d'Herelle it has been a subject of scientific controversy.

"It seems to exhibit a stimulating effect on homologous or closely related bacterial species," Dr. Bronfenbrenner said. "As a result, the rate of intracellular metabolism is abnormally increased with a consequent increase in osmotic pressure within the cell, and if water is available in the surrounding medium, bacteria take it up, swell and finally burst."

The activity of the phage in suppressing the effects on animal tissue of a definite germ without harming the tissue was compared with activity of certain chemicals. The phage was active at a much wider range of dilutions than any of the five chemicals, mercuric chloride, phenol, formalin, tincture of iodine and chloramine, John E. Walker of the research laboratories of E. R. Squibb and Sons reported. The phage was active at dilutions ranging from full strength to a dilution of 1 to 512, while the nearest chemical, mercuric chloride, could only be diluted to one-sixteenth of the strength causing tissue destruction and still be active.

SEARCH for sources of ergosterol, from which vitamin D may be obtained, has led scientists to examination of certain micro-organisms. However, the search so far has not met with success. Non-disease-producing cultures of the tuberculosis organism did not contain any ergosterol when examined by Paul S. Prickett, C. N. Massengale and Warren M. Cox, Jr., of the research laboratories of Mead Johnson and Co.

On the other hand, the cultures of the organisms grew equally well when both activated and unactivated ergosterol had been added to them. The activated ergosterol used in the experiment had a potency 250,000 times that of cod liver oil. This would seem to indicate that activated ergosterol has no germ-killing power, although it is a potent substance which can prevent and cure rickets.

Since ergosterol is a sterol and closely allied to the lipoid fraction of a material, the possibility of the tubercle organism, which contains about 50 per cent. lipoid fraction, being a source of ergosterol led to its examination, the bacteriologists explained.

BECAUSE of the number of animal diseases which may be transmitted to man, veterinary medicine is a necessary factor in the care of the public health. Four men who made outstanding contributions to our knowledge of disease, Jenner, Pasteur, Koch and Theobald Smith, are claimed by the veterinary profession because all of them were interested in animal diseases. So Pierre A. Fish of the New York State Veterinary College told the medical science section.

Tuberculosis, undulant fever, and tularemia are prominent diseases which are transmitted from animals to man, others being anthrax, glanders, foot and mouth disease, cow pox, rabies, actinomycosis, infectious jaundice, rat-bite fever and bubonic plague. For the control of these diseases public health officers and veterinarians must work together. Veterinarians contributed largely to the health of the army during the world war by careful inspection of all meat, milk and their products before consumption, Dr. Fish pointed out.

The importance of continued study of the parasites of man and the lower animals was emphasized by Dr. Maurice C. Hall of the U. S. Bureau of Animal Industry. Parasites may be transferred from one host to another, as from wild to domestic animals and from animals to man, and also in the reverse direction. The parasite in these cases seems able to adapt itself easily to the new host, but the host generally is not so adaptable and as a result shows evidence of hostility to the parasite which we recognize as a disease-picture. Veterinary parasitology is daily becoming of greater importance to the livestock industry, while human parasitology is still of major importance in the tropics, Dr. Hall said.

"The efficient research worker in human medicine must be prepared to carry his investigations, if necessary, into the cow stable, hog pen, or hen house," Dr. John R. Mohler, chief of the U. S. Bureau of Animal Industry, observed in his address before the same section, in which he discussed the menace of animal diseases to the human family.

"Similarly, investigators of such animal diseases as tuberculosis, milk sickness, rabies and abortion disease find that owners of affected animals are often most concerned about the human health phase of these maladies," Dr. Mohler said. "It is plain that the relation between animal diseases and public health not only is intimately close, but also that the study of livestock problems and sciences dealing with them contribute in a surprising degree to public health and welfare," he concluded.

STRANGE secrets of human diseases are being revealed by studies on the comparative reactions of various drugs and poisons on animal protoplasm on the one hand, and on plant protoplasm on the other.

What is one man's poison is another man's meat, might almost be said of plants and animals, Dr. David I. Macht of Baltimore found, for substances which had a toxic effect on living animal tissues did not affect living plant tissues unfavorably at all, and vice versa.

Making use of this phenomenon, Dr. Macht has found that human blood serum in certain diseases contains substances toxic to the seedlings of a certain species of plant. Such a toxin is present in the grave skin disease, pemphigus, Dr. Macht and Dr. Isaac Pels, a skin specialist of Baltimore, found..

In a similar study, Dr. Macht found a toxic substance in the blood of leprosy patients, he reported. Studies of the blood sera of treated and untreated leprosy patients, as well as laboratory studies of toxic sera with and without chaulmoogra oil, demonstrated that in this substance there is a real chemotherapeutic antagonist for the leprosy serum, which explains the excellent results obtained in that disease by field workers using the chaulmoogra oil treatment.

Entomological Study Considered Fun

Biology

But Scientists' Pleasure Has Economic Value

WHY do we study insects? Dr. E. P. Felt, of Stamford, Conn., asked this question at one of the meetings of the American Association for the Advancement of Science and then answered it himself. Entomologists keep on studying insects mainly for the fun of it, he declared.

It is true, Dr. Felt admitted, that economic entomology figures enormously, when we spend ten millions in one season's war against the European corn borer, and calmly contemplate spending fifteen millions on the Mediterranean fruit fly campaign. Yet even the economic entomologists are in the game largely for the fun of it, he thinks.

Prof. C. T. Brues of the Bussey Institution, Harvard University, reviewed the varied table manners of different kinds of insects and discussed the effects of these preferences on man's affairs.

For insects have choices as to what they will eat and what they will reject, no less than humans or horses. Some of them will eat almost anything they can fasten their jaws on, while others will reject all but a single item on the whole wide world's bill of fare.

The cockroach, one of the most ancient and primitive of all insects, is also one of the least "choosy", Prof. Brues said. It will eat almost anything, either vegetable or animal, but other insects equally ancient, like the dragonflies, already show special preferences, sticking strictly to a diet of freshly captured insects. Some of the later-developed insect groups show a graduation in choice within a single family or genus. Some species of wasps, for example, are willing to use a variety of spiders and insects in provisioning their nests, while others depend on a single species to supply them with meat.

The same is even more strikingly the case among plant-eating insects. Everybody knows how thoroughly grasshoppers strip vegetation, and in the East the Japanese beetle is establishing a record almost as bad. Others again will feed on a number of different plants, as the gipsy moth caterpillar feeds on several kinds of shade trees; but these have a more limited number of host plants.

Among the worst of the pests man has to deal with are insects so highly specialized that they cannot or at least will not feed on anything but one kind of plant. The potato beetle and the cotton boll weevil are high on this "bad eminence". It is largely against them that quarantine barriers are erected, and for their undoing that entomologists comb the world seeking other insects that will kill or weaken them or prey upon their eggs and young.

BREEDING corn with as much attention to the pedigree of the individual plant as is now bestowed on the pedigree of the individual animal in horse or hog breeding will result in a great increase in midwestern farm productivity within the next ten years.

This in effect is the prophecy made by Henry Wallace, editor of *Wallace's Farmer* and practical scientific corn breeder. He told of the methods of modern corn breeding, by which one can select qualities desired and put them into the new strain as a cook stirs ingredients for a cake together in a bowl, producing what might almost be called a synthetic corn plant.

The work is done by inbreeding numerous strains of corn and segregating their offspring, until the tangle of their hybrid origin is unsnarled and the desired qualities remain as pure "unit characters". These inbred strains are used as the pollen-producers, or fathers of the new crop. They are planted among the rows of "mother" stalks, which are deprived of their tassels so that they cannot produce any pollen of their own to contaminate the seed corn.

A paradox in the production of high-yield inbred corn was pointed out by Dr. R. A. Brink of the University of Wisconsin. In working out the undesirable qualities of the ancestral corn during the first period of inbreeding, the strain undergoes an apparent retrogression, often becoming more and more stunted and yielding less and less seed. Yet two of these "runt" parents can be crossed to produce a giant offspring with a yield greater than that of any strain figuring in its pedigree.

Dr. Brink told of the various methods by which these highly purified "aristocratic" corn ancestors are mated to produce the desired new combination in their descendants. Sometimes two of them will be crossed, and the resultant hybrid crossed again with a third. Sometimes two pairs will be crossed to produce hybrids, and these two hybrid strains re-hybridized with each other. The method he proposed is to take the first pair of hybrids and keep each of the two going separately for several generations until they come to equilibrium, and then to make the second cross.

Dr. H. K. Hayes of the University of Minnesota told of results obtained in his state with the introduction of the new type corn.

"The double crosses matured somewhat earlier than the normal varieties," he said. "A greater percentage of the ears were mature at time of husking than in the normal varieties. This is a very valuable characteristic in Minnesota. An increased yield together with earlier maturity means much more than a greater increase in yielding ability without an increase in earliness of maturity."

THE wild grass of the western prairies and the plains country, free as air when the long-horned cattle succeeded the bison as kings of the range, is now an important factor in the meat and wool economics of this country, and anything that cuts down its yield is a matter of concern to the biologists who study it and the range managers who administer it. At the Iowa State College, a group of botanists and zoologists who have expert knowledge of range grass problems pooled the results of their studies in a symposium, under the auspices of the Ecological Society of America.

One of the most striking phases of the range problem is the expense of maintaining wild rodents. This was discussed by Dr. Walter P. Taylor of the U. S. Biological Survey. Wild rats and mice, rabbits, ground squirrels and gophers, prairie dogs, marmots and other swarming small animals that gnaw for a living, all levy toll on the valuable wild grass crop of the West. Their depredations sometimes add up to a total of $150,000,000 a year, Dr. Taylor stated. It is obviously of importance to get some estimate of their numbers and rate of increase if means are to be devised to keep them in check.

Prof. A. E. (*Turn to page* 14)

Government Needs Anthropologists To Aid in Solving Problems

Anthropology

FOR 43 years scientists of the Smithsonian Institution and at various universities and museums have been gathering knowledge about Indian life and customs, yet there is little evidence that Congress and government officials realize that great research organizations stand waiting to aid in solving the difficult Indian problem, Dr. Fay-Cooper Cole, of the National Research Council, declared in his address as vice president of the group of anthropologists attending the meeting of the American Association for the Advancement of Science.

Dr. Cole pointed out that white men handling native situations in various countries have been successful in cases where they studied the ways of the natives and made laws and arrangements for them which conformed as closely as possible to the customary ways of the land. This was done in the Philippines, he stated, with the result that friendly relations with nearly all the tribes were established, and there was a minimum of bloodshed.

It has been done recently in the British schools north of Lake Tanganyika in Africa, where chiefs of the tribes cooperate with the white teachers as instructors, and the regular tribal institutions are used as the medium for teaching improvements in hygiene, lessons in agriculture, good standards of living, and ordinary school book lessons. The students retain their pride of race and tribe and add the white man's improvements according to their ability. Before any of this was attempted, six months were given over to an anthropological study of three of the tribes, during which time the friendship of the chiefs and elders was gained and the white teachers were content to remain students, seeing what was valuable and needed in the old customs.

The Indian problem is far more complex because the instruction and guidance which would fit a group like the sedentary Pueblos has little practical value or interest for his neighbors who are semi-nomadic.

"It is useless to teach the Navajo how to build good houses without attempting to reach and modify the belief that a dwelling must be destroyed or abandoned upon the death of a member of the family," Dr. Cole stated. "It is neither wise nor right to deny the Indian the privilege of conducting a native dance by means of which he hopes to influence the powers which control the rain, or which produce fertility. This has often been advocated, but the sponsors should realize that by so doing they not only kindle native resentment, but having forced the rites into secret practices have really strengthened the hold of the old ways upon the native mind."

It is only by following such a policy as that of the British in Africa that we can slowly shape and modify native life and customs, Dr. Cole stated. There is a mine of information at the disposal of those who deal with the American aborigines, but few authorities on Indian life and customs are ever placed on the Boards of Indian Commissioners or put in political positions of high authority to deal with the Indians. The result is that even persons of high ideals are so confused by conflicting arguments that they accomplish little before the administration changes.

In another address, Dr. Cole expressed the opinion that races of men which build cities and make great contributions to progress are superior to races of men which live in savagery not so much because the superior races have more innate ability but because chance has favored them.

To prove that "favorable circumstances and ethnic accidents" play the chief role in the rise of human groups, Dr. Cole cited the Indian tribes of America, some of which advanced far toward civilization, whereas others remained static.

In Europe and the Near East, he continued, the leadership of civilization shifted from the valleys of the Euphrates and the Nile to Crete, to Greece, to Rome, and finally to central and northern Europe. When Egypt was civilized, Rome was crude and barbarous. When Rome got its chance and rose in power and splendor, the northern Europeans were still semi-savages. But once they became civilized, those retarded peoples became leaders of the world.

Accepting the theory that all races of men might trace ancestry back to a common ancestor, Dr. Cole expressed the opinion that the present differences in races are chiefly the result of mutations, isolation, and inbreeding.

DEFECTIVE individuals should not be allowed to reproduce and multiply the burden of their kind upon society, declared Prof. G. H. Parker, head of the zoology department of Harvard University, before the annual meeting of the Society of Sigma Xi.

The great influence of heredity upon the characteristics of a person, brought out more strikingly than ever by recent scientific observations, should cause people to protect themselves at once from a great menace, Professor Parker said.

"In experimenting on race betterment it seems quite clear that the place to begin is with the most defective members of society," he stated. "Those who are state wards and must be cared for by state funds, and those whose defects are hereditary should in some way or other be restrained from reproduction. Such a step may be carried out by segregation, which has been advocated by many public custodians, but a much more radical means of controlling defective individuals is sterilization.

"When sterilization is considered," he continued, "it is always easy for one to point out who should be sterilized. We all know the personalities about us who are objectionable, and we can quickly point out the stocks that should not reproduce.

"But sterilization is an operation that should not be allowed to proceed excepting in proper hands. It is an operation that should be permitted only through a court medically advised."

California, with a eugenic sterilization law for about 20 years and more than 6000 cases of legal sterilization, was pointed out as the most forward state of those that have adopted sterilization.

The influence of organic inheritance has been greatly depreciated in the past, Prof. Parker said, the belief being that people are influenced to a greater extent by environment.

Sight of Mercury Opens New Year

Astronomy

By James Stokley

THE planet Mercury, least often seen of all the members of the Solar System that come at all within the limits of naked-eye visibility, is the first planetary decoration of the 1930 sky. Traveling around an orbit so close to the sun, it is usually lost in his brilliant glare. But once in each of its revolutions, its motion carries it to the east of the sun, and it can be seen above the western horizon for perhaps an hour or so after sunset. Once in 116 days it comes to this position — what astronomers call the "greatest eastern elongation" — and then it may be visible for a few evenings in the western twilight.

Such an occasion comes this month, on January 6. For a few days before or after (better before, because then the moon is less bright) that date, look in the western sky as it darkens after sunset. A little to the south of due west, not far above the horizon, you may be rewarded by seeing a brilliant point of light, if your eyes are keen enough and the weather is clear. This is the planet Mercury. On the sixth it will be of the minus .3 magnitude, which means that it will be brighter than any nearby star.

On the average only 36,000,000 miles from the sun, as compared with our earth's 93,000,000 miles, Mercury is a burned-out world. Mt. Wilson Observatory astronomers have found that the side towards the sun gets as hot as 350 degrees Centigrade (680 degrees Fahrenheit), hot enough to melt lead, while the side away from the sun becomes very cold. It is not quite certain how long the planet takes to turn on its axis, but there is good evidence for supposing that it is 88 days, the same time that it takes to revolve around the sun. Hence, its day may be the same length as its year, and, like the moon and the earth, it may always keep the same side towards the sun. As far as astronomers can tell, it has practically no atmosphere, so Mercury is not a very inviting planet.

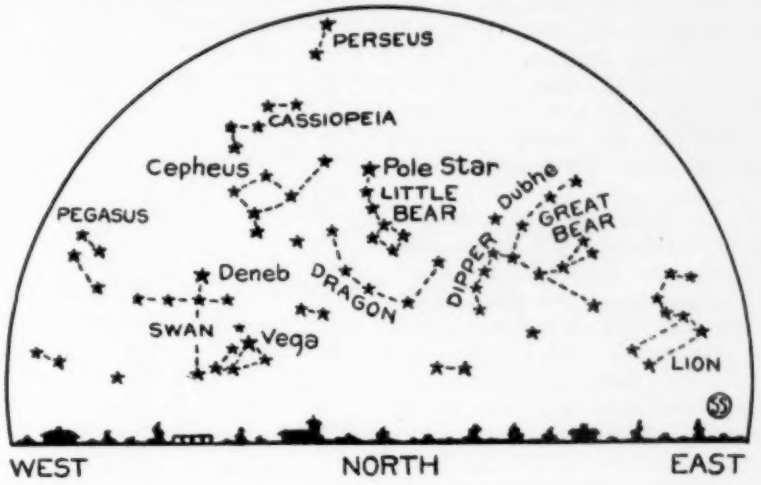
The other planetary occupant of the January evening sky that can be seen with the naked eye is Jupiter. All through the month it is high in the southern sky, above and to the right of Aldebaran, the eye of Taurus, the bull. It is of the minus 2.2 magnitude, far brighter than any star or other planet.

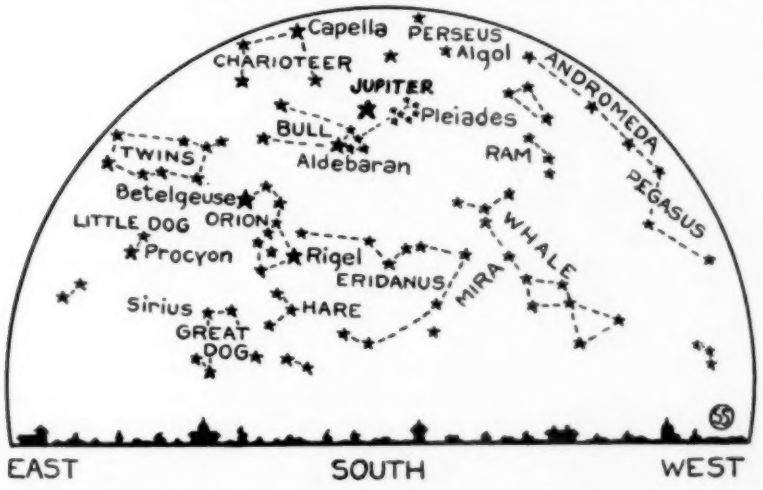
Nine first magnitude stars join Jupiter and Mercury to lend brilliance to the January evening sky. Brightest of all is Sirius, in Canis Major, the great dog. This, the most brilliant of all the stars but the sun, can be seen in the southeast; it is also the nearest of all the naked-eye stars visible from the United States. It is only 52,600,000,000,000 miles away, or, as the astronomer puts it, 8.6 light years. Though light travels so fast that a beam would go from New York to San Francisco in a seventy-fifth of a second, we see Sirius tonight by light that started on its long journey in May, 1922.

Higher and farther west this month is Orion, the heavenly warrior, supposed to be raising a club with which to smite the bull, Taurus. Orion has two first magnitude stars—Betelgeuse, the upper one, and Rigel, the lower.

In Taurus is Aldebaran, already mentioned. Also of interest in this constellation are two smaller groups of stars, or loose clusters. One, the Hyades, is close to Aldebaran, while the other, the Pleiades, is just west of Jupiter. Most people see six stars in this group, though it is said that as many as 16 can be seen under the best conditions by a keen eye. A pair of binoculars, or even of opera glasses, will reveal many ordinarily invisible.

East of Orion in Canis Minor, the little dog, is Procyon, another first magnitude star. To the north of Orion and Taurus, almost overhead, is Capella, in Auriga, the charioteer. Low in the northwest is Deneb, in Cygnus, the swan, which is just disappearing for the season. Pollux, the brighter of the two twins, is high in the eastern sky, while Regulus, at the end of the handle of the Sickle, in Leo, the lion, is below.





Hold these maps in front of you and face north or south. The upper or lower one will then show the stars of the January evening sky.

Science News-Letter, January 4, 1930

Vanished Sea

Back in the days when the massive continental glaciers were slowly and sullenly melting in their northward retreat, a huge fresh-water sea, an extension of what are now the Great Lakes, existed in northwestern Wisconsin. Geologists have found its old shores, left high and dry, and they have found also little scraps of water —ponds and small lakes—that are its relics.

Prof. N. C. Fassett of the University of Wisconsin told how botany has come to the aid of its sister science in checking up on the outlines of the ancient lake. On the margins of the relic ponds and lakelets, and even on the now waterless beach ridges, he has found numerous water-loving plant species that are characteristic of the Atlantic seaboard and of the dunes country around the southern end of Lake Michigan, but do not "belong" in the Wisconsin flora at all. They are plainly relics of the zones of vegetation that once fringed the margin of the vanished great lake, left as strangers in a strange land when the body of water primarily responsible for their immigration so far inland dried up or was drained away.

Botany
Science News-Letter, January 4, 1930

Fight Pests

The activities of a liason organization between the various institutions and individual scientists interested in fighting insect pests and plant diseases were described by Paul Moore of the Crop Protection Institute.

"To many it may seem strange to be talking of protecting crops, when the psychology of the hour is that there is a surplus and that those who have produced it are in dire straits financially," Mr. Moore said. "Yet if we ignore the fact that a billion dollars a year go to feeding bugs and relax in any degree the efforts to fight plague and pest, not only would farmers be the sufferers but the nation at large would face a real peril."

Entomology
Science News-Letter, January 4, 1930

Prairies

"Prairies" are not the wide, flat, lonesome, windswept plains that figure in Wild West song and story. The right name for such plains is just plain "plains".

The frequent misuse of the term "prairie" was corrected by Dr. P. A. Rydberg of the New York Botanical Garden, who has made a lifetime study of the plants of the West, and knows both prairies and plains.

The real prairies, he said, are the regions of gently rolling hills of the central Mississippi valley, of which Iowa and eastern Nebraska are good examples. These prairies are blessed with an annual rainfall of 30 inches or more, and originally supported a vegetation of long grasses. They are the best corn lands. The flat plains country to the west of the prairie region has a rainfall of 20 inches or less. Its original vegetation, which has survived far more extensively than that of the intensively cultivated prairies, was a response to the lower rainfall and other less favorable conditions, and had short and more scattered grasses as its principal constituents.

Physical Geography
Science News-Letter, January 4, 1930

Elk

Wanted—More room for the greatest Elk convention on earth.

In the southern part of Yellowstone National Park, and thence southward into the great valley known as Jackson Hole, there is the greatest of the surviving herds of American elk, or wapiti. Protected from their natural enemies, guarded by a strict closed season, fed with hay when natural forage fails, they have increased to more than 20,000 head, and are crowding the space and sustenance available for them.

O. J. Murie of the U. S. Biological Survey set forth the problem and suggested needed remedial steps. At present there are some ranch lands in the valley, and though part of these have been bought by groups of philanthropic citizens for dedication as a game range, there still remain some areas which must be added if the great herd is to be handled in the most natural and at the same time most efficient manner.

Zoology
Science News-Letter, January 4, 1930

Acid Soil

The Great Smoky Mountains, of the Tennessee-North Carolina boundary, where a new national park is being developed, owe their peculiar and rich plant life largely to the highly acid character of their soil. So Stanley A. Cain of Butler University has found.

The Great Smokies are a great mass of granite, which is naturally an acidic rock. They are furthermore exposed to one of the rainiest climates in the United States—ranking only behind the north Pacific coast and the southern tip of Florida in annual inches received. This causes the development of a thick vegetation, but the dead leaves and branches do not decompose perfectly, so that the resulting soil has an unusually high acidity.

This in turn results in the development of acid-loving vegetation types to an unusually high degree. Mosses which usually grow only in bogs grow freely there on high mountains and form peat deposits at altitudes of five or six thousand feet. The great laurel and rhododendron thickets, called "laurel slicks" by the mountaineers, have this highly acid soil to thank for their presence and their magnificent display of bloom in the spring.

Chemistry
Science News-Letter, January 4, 1930

In Various A.

Rot

The next victim of a well-aimed and rotten orange, grapefruit or sweet potato can immediately get to the root of his troubles by blaming a common microscopic fungus, a close relative to the cause of dry rot in corn, Dr. A. H. Eddins, of the Florida Agricultural Experiment Station, believes.

This organism was tested on corn by Dr. Eddins. The symptoms produced were all similar to the usual dry rot.

This fungus also causes a rot on watermelons.

Mycology
Science News-Letter, January 4, 1930

Fossil Forest

Indiana can boast of the remnants of a petrified forest like those of Arizona and Yellowstone National Park, except that the trees are much older, says Dr. Chester A. Arnold of the University of Michigan.

During the past summer he investigated reports that had come in from a number of sources, of petrified tree trunks in shale deposits in the southern part of Indiana. He found numerous trunks, in localities widely scattered over the whole region. They are often of large size, the largest specimen observed being nine feet long and three feet in diameter. They are all lying flat, and have no roots or branches.

The trees, Dr. Arnold said, are of Devonian age—older than the coal measures. Microscopic studies of the wood show them to be primitive gym-

A. S. Sessions

nosperms, possibly ancestral to our modern pines. They are especially interesting, he concluded, in view of the fact that the most ancient land-inhabiting plants we know about existed during Devonian times, and these trees may be near the starting point of higher plant evolution.

Paleontology
Science News-Letter, January 4, 1930

"Sunflower State"

Kansas has long borne the nickname of "Sunflower State"; but she must look to her laurels, or rather to her sunflowers, for her neighbor commonwealth of Iowa is pressing her closely for the honors of prairie botany. An Iowa botanist, Miss M. Rae Johns of Davenport, reviewed the army of Iowa sunflowers and their relatives. There is an imposing array of them: sixteen genera, comprising scores of species, ranging from the true sunflowers down to tiny creeping things like the introduced weed Galinsoga and up to the towering ragweeds, hated of hayfever sufferers.

Botany
Science News-Letter, January 4, 1930

Raising Rust

Better understanding of stem rust of wheat, which destroys a large part of America's crop, is promised by Margaret Newton, Thorvaldur Johnson and A. N. Brown, of the Dominion Rust Research Laboratory, Winnipeg, Canada, following recent experiments.

The varieties of rust which they produced in the laboratory are among the first hybrid fungi. Some new forms not known to exist in nature were raised.

Mycology
Science News-Letter, January 4, 1930

Not Irish

The lowly white potato, nicknamed "Irish" by some, whose more than 350,000,000 bushel annual production in the United States is the root of so serious an agricultural problem that the Federal Farm Board has set it apart for special treatment, is a native of America, like corn and tobacco. The Incas of Peru had it under cultivation for centuries before the Spanish invasion.

The tuber's history, from the time it was an important food in this lost South American civilization, as prehistoric mounds show, was traced through a slow rise to its present day place of prominence next to bread, by William Stuart of the U. S. Bureau of Plant Industry.

For 150 years after its discovery by Europeans, only well-to-do people ate the potato. It was raised in their gardens and the lower classes knew of it by hearsay alone.

Commercial production was begun about 1750. Now, by artificial propagation and sexual reproduction, science is producing new and improved varieties of the original potato.

Botany
Science News-Letter, January 4, 1930

Weed-Killer

Zinc sulphate, sometimes called white vitriol, will kill weeds in a plant bed full of conifer seedlings but will not harm the little trees, Prof. Ferdinand H. Steinmetz and Prof. Fay Hyland, of the University of Maine, have found.

Eight grams of zinc sulphate, dissolved in sufficient water and sprinkled over a square foot of ground, is most effective, it was learned. Germination of the seeds and growth of the little trees was only slightly reduced by the dose, while practically all the weeds were killed.

Agriculture
Science News-Letter, January 4, 1930

Fastidious Fungus

Apples should not be raised in a cedar-growing region and cedars should not be raised in an apple-growing region, Donald E. Bliss, pathologist at the Iowa Agricultural Experiment Station, has found.

A fastidious fungus which must make its home in apple trees and cedars at different times during its life keeps these trees from being neighbors.

On apples this fungus is known as apple rust; on cedars, as cedar rust. It must move from one tree to the other to complete its life cycle.

Mycology
Science News-Letter, January 4, 1930

First Corn

If a farmer would have the earliest crop of corn in his neighborhood, let him plant it first on the richest ground, Dr. J. R. Holbert, U. S. Agronomist at the Illinois Agricultural Experiment Station, advises.

Rich soil also helps make the latest corn, Dr. Holbert said, because in each case the soil fertility increases the resistance of the corn to cold. However, a naturally cold-sensitive strain will not equal naturally cold-resistant strain, even when grown in highly productive soil, he cautioned.

Agriculture
Science News-Letter, January 4, 1930

Dying Elms

America's most beautiful shade tree, the stately elm, may follow the chestnut to destruction if infected by the Dutch elm disease, which has already devastated the elms of Holland, Belgium, France and Germany, said Dr. Christine Buisman, a noted professor of plant pathology of the University of Utrecht, Netherlands.

Methods of controlling the disease have not yet been found, Dr. Buisman said. The only thing that can be done now is to test varieties of elms to determine their resistance and propagate the most promising ones. There is nothing to show that the disease will decrease in the course of time.

A tree first shows the effects of the disease when the twigs curl and the leaves of the whole tree or some of its branches suddenly wither and turn down. The leaves do not fall immediately, those in the top remaining for several weeks. In the wood of a diseased tree conspicuous reddish-brown streaks become visible. A tree thus affected may die within the year or it may live for several years. Most of the affected trees are from 15 to 40 years old, accounting, perhaps, for the rarity of the malady in nurseries.

The disease first appeared in Holland in 1920. It has gradually spread through Belgium, France and Germany, and since 1927 it has been reported from England.

The spores of the causal agent are principally disseminated by the wind and enter the wood through small wounds.

Forestry
Science News-Letter, January 4, 1930

Hardiness Tested

Scientists may soon be able to determine the hardiness of plants by laboratory tests, as the result of experiments conducted by Prof. S. T. Dexter, of the University of Wisconsin.

When a wilted carrot or potato soaks up water and becomes crisp again, it does so largely by the process of osmosis. Just the opposite happened in Prof. Dexter's experiments. He put several varieties of alfalfa roots in freezing water at different seasons. The loss of sap was measured and it was found that the hardiest varieties lose least sap in the winter.

"If the measurements in the experiments can be standardized," Prof. Dexter says, "they may serve as indices of plant hardiness."

Botany
Science News-Letter, January 4, 1930

The meetings in Des Moines were of great interest to the botanist. Besides the meetings of the American Association for the Advancement of Science, there were sessions of the Botanical Society of America, the Ecological Society of America, the American Phytopathological Society, and the American Society of Plant Physiologists. A few of the papers are reported for you here.

Soil of Utmost Importance in the Growth of Plants

Botany

PLANTS, both wild and cultivated, are just as particular about the composition of the water they take from the soil as people are about the water they take from their household faucets. Like human beings and lower animals, they refuse to live where the water is unsuitable, and thrive best where they find the water "right."

How biologists are able to inquire into these soil-solution preferences and what they learn from their inquiries was discussed in a symposium of the Ecological Society of America. Four leading plant and animal scientists led the discussion: Prof. J. F. McClendon of the University of Minnesota, Prof. E. Truog of the University of Wisconsin, Prof. Herman Kurz of the Florida State College for Women, and Prof. E. B. Powers of the University of Tennessee.

Prof. McClendon opened with an outline of the theory of soil acidity and a description of the methods available for testing it. The latter have progressed far beyond the simple slip of litmus paper that used to suffice and is still employed in many places. Several field kits, with graded series of delicate color tests in various solutions, can now be obtained by the student of soil acidity problems, as well as electrical apparatus for more direct measurements.

What crop plants like and do not like in soils was the subject of Prof. Truog's address. It used to be flatly assumed that acid soils were bad for all crops, but the modern doctrine is not so simple as that. There are some crops, to be sure, so sensitive that they will not yield well if the acidity to which their roots are exposed rises above a very low minimum; but there are others, normally neutral-soil plants, that will tolerate a considerable concentration. Such plants are useful "breaking-in" crops for newly drained peat and muck lands, and other places where the acidity is still high. Finally, there are some cultivated plants which in their native state demand a really highly acid soil. Blueberries and cranberries belong to this class. These must be cultivated on land as much like their native habitats as possible. Realization of the acid preferences or phobias of plants has done much to help farmers and horticulturists to adapt their crops to the land available.

A sufficiently skilled botanist can walk on to a piece of land new to him, and by counting certain plants tell the acid concentration of the soil with considerable accuracy before a chemical test is made at all. Prof. Kurz told of studies of the relation of plant distribution to soil acidity.

The pioneer work in this field was done thirteen years ago, by Dr. Edgar T. Wherry of the U. S. Department of Agriculture, who is both chemist and botanist. Since his time the work has been carried on actively by scores of researchers all over the world.

It is possible not only to estimate the soil acidity by studying the plants that grow on it, but to predict with a considerable degree of accuracy the probability of finding a given species of plant if the chemical state of the soil is known, Prof. Kurz stated.

Animals as well as plants are influenced by the chemical nature of the water to which they are exposed. This is especially true of aquatic animals, which are not only very intimately exposed to the water, but are free to move away from a locality they do not like or into one which they do. This aspect of the problem was the theme of Prof. Powers' discussion.

HOW a cornfield to a certain extent makes its own weather was related by Dr. J. M. Aikman of Iowa State College.

As everybody knows, weather has a great influence on crops; but the weather we get from the Weather Bureau might be called just "average" weather. The cornstalk in the field is not interested in averages; what affects its life is how much sunlight reaches its individual self, and to what extent it has to give up, by evaporation, the water it has drawn from the soil.

Dr. Aikman set out to study the "micro-climate" of a cornfield, as affected by the corn plants themselves. He set out instruments to measure the humidity and evaporating power of the air, the temperature of air and soil, and the intensity of sunlight. He measured three different plantings of corn in this way; one a field with two stalks to the hill, one with three and one with five.

In general, he found that the denser the stand the higher the humidity, the lower the evaporation rate among the stalks, and the less sunlight reached the lower leaves. The evaporation rate, for example, was ten per cent. higher in the "thin" field than in the densely planted one. Missing stalks in the hills, causing irregular gaps in the field, introduced wide fluctuations in all the "microclimatic" readings."

Young oak trees must have plenty of sunlight if they are to develop strong root systems, Prof. A. E. Holch, of the University of Nebraska, pointed out. He studied young burr-oaks on an open hilltop, in an open stand of oaks, and in a more densely grown stand of linden. Year-old seedlings in the full light of the hilltop developed a root depth of five feet and a total spread of 2.25 feet. Trees of the same age in the 12 per cent.

light of the oak forest had a root depth of 1.6 feet and a spread of nine-tenths of a foot, while in the shade of the lindens, where there was only a 3 to 4 per cent. light, the roots reached a depth of only eleven inches and had a three-inch spread.

Botanical Society

Individual plant cells, that were alive when Jefferson wrote the Declaration of Independence and Washington fought to make it good, were described before the Botanical Society of America by Prof. J. B. Overton of the University of Wisconsin.

Some years ago Dr. D. T. MacDougal of the Desert Laboratory, Tucson, Ariz., discovered cells in certain cacti which live and retain their individuality for more than a century. Prof. Overton, who has been associated with Dr. MacDougal in the study of these cells, has continued the investigation on their structure and chemistry.

In the giant cactus and the barrel cactus some of the cells attain great age—150 to 200 years in extreme cases. Some of the cells of the core, or pith, of these plants have been continuously alive and active since the Declaration of Independence, or even earlier.

These long-lived cells furnish an opportunity for the study of the effects of age on living matter. The young cells are thin-walled, lack a central sap cavity, contain relatively large amounts of water and are rich in mucilages, nitrogen and phosphorus, and the percentage of dry matter is relatively small; while the old cells are thick-walled, contain a large central cavity, have relatively much less water, more dry matter, less nitrogen and less phosphorus.

It is notable that probably some cells of long-lived animals, like those in the central nervous system of the parrot and elephant, live and retain their individuality as long as the individual lives. In these long-lived animals the long-lived cells are very specialized in structure and function, while the long-lived cells of the cacti are of a simple undifferentiated type. The chief differences between young and old cells are not so much structural characters as chemical ones.

All living things generate currents of electricity, minute but measurable, and this electricity is the force that influences their rate of growth and determines their form.

Evidence in support of this doctrine was presented by Prof. E. J. Lund of the University of Texas.

The unit of electrical generation in the living plant or animal, just as in an electrical battery, is the cell—although the living cell is a vastly different thing from the electrician's cell. The voltage of each cell is added to that of the one in front of it in the direction in which the tiny current is flowing, and its amount and intensity have great influence in the activities of the organism as a whole.

It has been possible to find electrical currents in living trees. In the Douglas fir and the white fir the current has been shown to flow continuously upward in the outer layers of wood, and downward through the inner layer of the bark, Prof. Lund said.

The existence of the currents is dependent on the activities of the living cells. They have been made to disappear by applying certain anesthetics and poisons to some cells, by depriving others of oxygen, and by other means. Conversely, subjecting growing plants of various kinds to the flow of an outside current has caused marked modifications in their final form.

"The experiments distinctly indicate," Prof. Lund concluded, "that the existence of continuous bioelectric currents will contribute to an explanation of how ordered growth and regeneration can occur in primitive and embryonic plant and animal tissues where no nervous or hormone mechanism is known. The facts appear to open up a new avenue of approach to many obscure and difficult problems in embryology, growth and regeneration."

Prof. Lund was followed on the program by his associate at the University of Texas, Gordon Marsh, who told of experiments in passing electric currents through roots.

Wandering Plants

THE classic boast of the old cowboy song, that "I've swum the Mississippi and I've clumb the Great Divide," is true for rooted plants no less than for beings blessed with means for bipedal locomotion. Plants also climb the Great Divide, Prof. Aven Nelson of the University of Wyoming, veteran western botanist, told members of the American Association for the Advancement of Science.

One of these passes accessible to plants is in Yellowstone National Park.

"A certain small area in Yellowstone Park," said Prof. Nelson, "is a sort of 'no man's land' out of which the headwaters of three great river systems spring—the Yellowstone, the Snake and the Green as important tributaries of the Missouri, the Colorado and the Columbia system. It is to be remembered that the watershed divide does not necessarily coincide with the high peaks and ranges. The continental divide in certain places is found on high table-lands so level that only the observed drainage or the surveyor's instrument can locate it.

"These high table-lands often of great extent, lying between the interrupted ranges, constitute the passes that permit the construction of great roadways connecting the East with the West,—the Union Pacific Railroad, the Lincoln Highway, and the Transcontinental Airways, for instance. It may be well also to remind ourselves that these passes permit not only the mingling of peoples but of plants. Were the barriers more complete we could speak more definitely of a Pacific and an Atlantic flora.

THE adobe missions of Southern California have become valuable to the botanist as an archaeological source of information on the history of plant life of the southwestern part of the United States.

An accidental find, described by Prof. George W. Hendry, of the University of California, is now revealing extensive knowledge of the sources of plants and weeds of a large section of the country—a subject of which the present world is as ignorant as it is of the sources of the flora of the Roman empire.

Prof. Hendry was looking for the source of black oats, famous in Sonoma county, California, when he noticed that adobe bricks contain well-preserved specimens of vegetation. Since that time, 14 sun-dried brick buildings in different parts of California have been examined, but not one sprig of black oats has been found.

The approximate dates of introduction and sources of many plants and weeds, however, have been accurately determined from a careful study of the ages of the buildings in which they occur. In spite of the fact that much of this valuable vegetation has been embedded in the clay for more than a century and a half, it is still preserved well enough for identification.

Contrary to popular belief, it has been definitely established from these finds that wheat was introduced into California during the Spanish period.

Sticks and Stones in Air We Breathe

Meteorology

Weather Scientists Discuss Air and Water

"NOT all we breathe is air. With every breath we inhale a million micro-sticks-and-stones and a host of other things that are no part of a pure atmosphere," said Dr. W. J. Humphreys, of the U. S. Weather Bureau, at one of the meetings in Des Moines.

"Where do they come from?" he inquired, and answered, "The heavens above and the earth beneath. Every wind that sweeps a desert catches up tons, and sometimes millions of tons, of pulverized rock to spread far and wide. Fragments of vegetable fiber litter the soil the world over and are wafted hither and yon as even the gentlest breeze may blow. Pollen of conifers, ragweeds, and a thousand other trees and plants we must take into our lungs from spring to fall every day we breathe the open air. And our bronchial tubes need chimney sweeps (luckily provided by nature) to get rid of their coatings of soot from kitchens, factories and forest fires.

"Even the ocean, through its evaporated spray, makes a salt mine of the air that we breathe. Then, too, lightning sprays nitrogen acids into the atmosphere, while soft coal and volcanic vents similarly add the sulphur acids—but all are too dilute really to bother us.

"Spores and microbes of many kinds we just have to inhale, for they are everywhere. And as if all this were not enough the earth, every now and then, explodes at some great volcano and hurls tons upon tons of rock powder into the air where it drifts far away for weeks, months or years, according to its degree of fineness and initial height attained.

"Finally, in addition to all this dust the world stirs up of its own, the atmosphere to its outermost limits is filled with the ashes, so to speak, of daily millions of incinerated meteors or shooting stars. That is how the earth got its konisphere or dust shell. If it had no atmosphere it would have no konisphere, but having an atmosphere it must also have a coexistent and coextensive konisphere."

Just as one may sleep warmly out of doors under a quilt, or shiver under a sheet, so the upper atmosphere, what scientists call the stratosphere, is kept warm over arctic latitudes by a thick layer of ozone. This was the explanation for a curious fact that has puzzled scientists, given by Dr. Humphreys.

The stratosphere is the layer of the atmosphere above the highest clouds, and unlike the lower layers, does not become colder with height. Temperature observations have been made of this layer by means of small balloons, equipped with recording thermometers. They reveal the curious fact, said Dr. Humphreys, "that the stratosphere is coldest over equatorial regions and becomes gradually warmer with increase of latitude, the extreme difference being around 35 degrees Fahrenheit—coldest over the warmest earth and warmest over the coldest earth."

Though a full explanation has not yet been made, Dr. Humphreys thinks that it is due to the ozone. Observations have shown that there is less ozone over equatorial than over arctic regions, a fact that is itself yet unexplained. But the ozone absorbs radiation from the earth, and reradiates part of it back again. Therefore, where there is more ozone, more heat is sent back, and so the upper atmosphere there is warmest.

MEASUREMENTS of the exact way in which the temperature of the Gulf Stream varies from one side to the other may aid in forecasting weather in the eastern United States, Prof. Charles F. Brooks, of Clark University, believes.

Recording thermometers have been placed on ships crossing the Gulf Stream at five different places in the Straits of Florida. Details of the temperature, alternating masses of warmer and cooler water, daily ranges in temperature and rapid changes of distribution are all written on the thermograph record, said Dr. Brooks.

"High temperature, speed, magnitude, and location makes the Gulf Stream the best known of all ocean currents," said Dr. Brooks. "The habitability of northwestern Europe is commonly ascribed to the high temperatures of the Gulf Stream, though this current is only part of the warm flow that ameliorates European climate. The importance of the Gulf Stream and the other warm waters of the western Atlantic has still to be fully appreciated. These warm seas are the progenitors of storms and the sources of rainfall.

"The speed of the current, 1 to 4 knots, is a notable aid and hindrance to navigation, though less so nowadays than in the periods of sailing ships. The commerce of the busiest ocean feels the movement, the warmth and the storms of the Gulf Stream. Even aerial navigation is disturbed by the bumpy air over it."

Relations between summer atmospheric pressure over the Pacific, and the temperature of the following winter of the upper Mississippi valley, that may develop into a method of forecasting mild or severe winters, were announced by Prof. Thomas A. Blair, of the University of Nebraska.

The winters in this region differ widely in temperature, said Prof. Blair. Some are almost continuously cold, while others are moderate with only brief cold periods. Methods of predicting in advance the severity would be of great value.

In a study of records for the past sixteen years, Prof. Blair has found that the severe winters are preceded by a belt of summer excess air pressure across the Pacific, including usually the west coast of the United States, the Philippines, Japan and Hawaii. In the autumns there are large areas of excess in the North Pacific. Warm winters, on the other hand, are preceded generally by a pressure deficiency over the Pacific belt, though sometimes it is farther north, including Alaska and Siberia, with pressures higher than normal at Honolulu and Manila.

Further study of these relations may lead to a method of accurate forecasting.

DESPITE the opinion of oldest inhabitants that the weather nowadays "ain't like what it was when I was a boy," the huge territory west of the Mississippi that formed the Louisiana Purchase enjoyed the same sort of climate in 1804 and 1805 as today. A century and a quarter ago exactly, at Fort Mandan, North Dakota, near the present city of Bismarck, the temperature at sunrise was four degrees below zero Fahrenheit, according to G. K. Greening, of the Weather Bureau at Sioux City, Iowa. The thermometer that recorded this temperature was the only one in the whole territory from the middle Mis-

Brightest Comet in Years Discovered

Astronomy

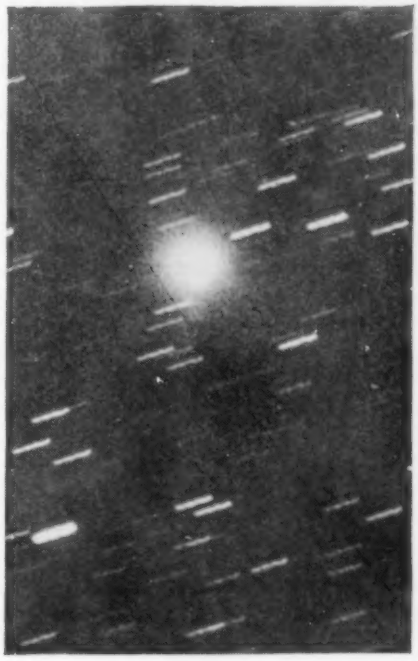
But Will Not Be Visible to Naked Eye

WILK'S comet, which was discovered on Dec. 20, by an astronomer in Poland, will not become conspicuous to the naked eye, even though it is brighter than any comet discovered for several years. This announcement was made to Science Service by Dr. A. O. Leuschner, director of the Students' Observatory of the University of California, following a preliminary calculation of the comet's path by E. C. Bower and F. L. Whipple.

These figures show that when the comet was discovered, it was 85,000,000 miles from the earth, and that it is now moving away from us. However, it is moving towards the sun, and on that account will brighten. This counteracts the greater distance from the earth, and so it will continue about the same brilliance for a few weeks. It is now about the eighth magnitude, too faint to be seen with the unaided eye even under best conditions, but a small telescope will reveal it. After January 8, it will be so close to the sun as to be lost in its glare. On January 22, it will reach perihelion, when it will be closest to the sun, at a distance of about 60,000,000 miles. After that it will probably appear to astronomers in the southern hemisphere for a few weeks.

When discovered, the comet was near the bright star Vega, seen low in the northwestern sky for a few hours after sunset, or low in the northeast for a few hours before sunrise. Since then it has been moving south and eastward, passing near Albireo, the bottom star of the northern cross, on Dec. 28. On Jan. 5 it will pass the constellation of Delphinus, or "Job's coffin", a diamond shaped group of faint stars seen in the west above the bright star Altair, in the eagle, just after sunset.

The calculation of the path was made with the aid of observations at Heidelberg, Germany; Yerkes Observatory, Wisconsin, and the University of California's Lick Observatory at Mt. Hamilton. In order to compute a comet's orbit, three positions are required, somewhat similarly to the way in which three points determine a circle. Any number of circles can be drawn to include a single point. Any number of circles, with a diameter at least as large as the distance between them, may be drawn so as to include two points. But only a single circle can be drawn so as to include three given points not on a straight line.



Wilk's Comet

Since the laws of a comet's motion around the sun are pretty well known the three observations of its position permit the calculation of its path. But the farther apart the observations are, the more accurately can the path be determined. The orbit calculated at Berkeley was from some of the earliest observations, over a period of less than two days. They gave figures accurate enough to enable the comet to be followed with the astronomers' telescopes without trouble, but a later, and more accurate determination will be made after observations have extended over several weeks.

The final orbit will tell whether the comet is really a new one, or an old one that has returned. Dr. Leuschner said that its orbit seems to show some resemblance to several others in the past, but that this cannot be settled definitely until a more accurate orbit is calculated.

This is the fifth comet discovered during 1929. It was not the first comet to be discovered by Prof. Wilk, for in November, 1925, he found one which was discovered independently by L. C. Peltier, an amateur astronomer of Delphos, Ohio. Consequently, it was named the Wilk-Peltier comet.

Science News-Letter, January 4, 1930

Sticks and Stones—*Continued*

souri valley to the Pacific Northwest, so far as present records show, said Mr. Greening.

This famous thermometer, which was unfortunately broken a little later, was carried by a man with the appropriate name of Meriwether. He was Captain Meriwether Lewis, who, with Captain William Clark, led the famous Lewis and Clark expedition which first opened up the Northwest to civilization. Their records contain the first weather diary of this part of the country, said Mr. Greening, and are still preserved at the hall of the American Philosophical Society in Philadelphia. In addition to the weather records, which show the weather in 1804 and 1805 to have been similar to that of the present, many other valuable data about the territory were first set down.

Seen on any clear moonless evening after twilight as a faint beam of light in the western sky, the zodiacal light has long been an object of study by astronomers and physicists. Dr. E. O. Hulburt, of the U. S. Navy's research laboratory, suggested its connection with magnetic storms that sometimes affect the earth.

Recalling observations made 75 years ago by a navy chaplain, Rev. George Jones, Dr. Hulburt pointed out that most abnormalities of the zodiacal light, such as fluctuations, unusual brilliance or distribution over the heavens, followed magnetic storms. This, he thinks, indicates some connection, and suggests that the particles which cause the zodiacal light, by scattering light from the sun in some manner, originate in the atmosphere of the earth. The partly broken atoms high in the atmosphere may cause the phenomenon under the combined effect of the pressure of sunlight, the gravitation and magnetism of the earth.

Science News-Letter, January 4, 1930

Artificial Atmosphere Is Better

Physiology

Helium, the gas that makes the American non-inflammable airships possible, may prove of value in helping submarine crews to work more efficiently, if a suggestion made by Dr. J. Willard Hershey, of McPherson College, is adopted. Speaking before the chemists attending the meeting of the American Association for the Advancement of Science, he told of his study of artificial atmospheres. Some mixtures of gases, quite different from the mixture that forms the air we breathe, supported life of mice and guinea pigs even better than ordinary air, he discovered.

Natural air contains 21 per cent. oxygen, 78 per cent. nitrogen and 1 per cent. of a mixture of gases, including carbon dioxide, helium, argon, krypton, neon and xenon. One series of experiments on white mice showed that a mixture of nitrogen and oxygen, in the same proportion as in air but without the other gases, only supported life for a few days. This demonstrated that the rare gases are necessary for life, said Dr. Hershey.

In pure oxygen, the animals lived only two to five days, while a similar group of animals, also kept in a large bottle with normal food supply, but supplied with ordinary air, suffered no ill effects whatever. With a mixture of 60 per cent. oxygen and 40 per cent. nitrogen, however, the animalse lived as well as normally, if not better.

A mixture of 79 per cent. helium and 21 per cent. oxygen, practically ordinary air with the nitrogen replaced by helium, supported the life of mice in a normal manner. Using argon instead of helium and in the same proportion, the mice did not survive. Dr. Hershey pointed out that the argon mixture does not diffuse through the living cells as rapidly as natural air, while helium diffuses more rapidly. As the helium-oxygen atmosphere is considerably lighter than air, it would doubtless be possible for a person to live inside the gas bag of an airship containing it.

However, Dr. Hershey found that a mixture of 25 per cent. oxygen and 75 per cent. argon supported the life of mice, and that at the end of ten days in it they appeared better than at the start.

"In the field of practical application of prepared atmospheres there is a wide range of commercial uses and values," said Dr. Hershey. "Medical men have a fair knowledge of the action of oxygen in the air, but nothing is understood by them concerning the other gases. It is quite possible that a knowledge of atmospheres may aid in the control of diseases.

"In deep-sea diving, mines, and in submarines, foul air is encountered and is not sufficient in amount to sustain life. A prepared atmosphere for such activities would broaden their respective range of usefulness. An artificial atmosphere in a submarine that sustained life even more effectually than the normal air would bring about a safer and more efficient submarine. A prepared atmosphere would be of great advantage to the high-altitude flyer."

Dr. Hershey believes that the widest field of prepared atmospheres will be in the treatment of disease.

Science News-Letter, January 4, 1930

NATURE CAMPS

for

Teachers and Nature Lovers in the mountains of central Pennsylvania midst many rare plants and animals.

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First Camp—June 26 to July 17. Second Camp—July 16 to August 6.

Intensive Field Work

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Illustrated bulletin on request

Professor George R. Green

Director of Nature Camps

STATE COLLEGE, PA.

Good Radio—*Continued*

the year 1930 should show a general decrease in sun spot numbers as the year waxes, with a corresponding increase in radio signal strength in the broadcast zone. By the very end of 1930 and the beginning of 1931, the general rise of a secondary sun spot maximum should be evident. By 1931, however, it is believed that we shall be so far from the maximum of the 11-year period that the secondary maximum will have no effect upon radio reception and allied electro-magnetic phenomena as have the sun spot maxima of 1928-29. The general lifting of the ionization level in the earth's atmosphere should continue, with the fluctuations noted, through the next six years, but in 1934 solar activity should be as quiescent as at the last minimum of 1923."

Dr. Stetson believes that these radio changes are produced by variations in the height of this ionized layer of the atmosphere, known as the Kennelly-Heaviside layer. Long waves of 18 kilocycles show an opposite effect. Their reception is best when sun spots are most numerous.

Science News-Letter, January 4, 1930

Entomology—*Continued*

Aldous of Kansas State Agricultural College talked on the effect of different frequencies and heights of cutting on the yield and vigor of prairie grass vegetation. In general, his experiments showed that too frequent cropping off at the tops of the plants discouraged them from coming back with new herbage.

Dr. J. E. Weaver of the University of Nebraska discussed the effects of grazing on roots and other underground parts of plants. To obtain his data it was necessary for Dr. Weaver and his associates to become scholarly ditch-diggers, for the roots of prairie plants are frequently several times as long as their tops, and deep trenches have to be driven for considerable distances to get an idea of the form and distribution of roots.

Weather of course has as much effect on prairie vegetation as it has on plant life everywhere. Dr. W. G. McGinnies of the University of Arizona discussed the value of measuring the physical factors of weather and soil condition, such as evaporation rates, available soil moisture, intensity of sunshine and so on.

Science News-Letter, January 4, 1930

FIRST GLANCES AT NEW BOOKS

ENIGMAS: ANOTHER BOOK OF UNEXPLAINED FACTS — R. T. Gould—*Philip Allan—London* (12/6). The success of Lieutenant Commander Gould's "Oddities" (London & New York, 1928) has led him to publish a second book on this fascinating subject of "unexplained facts." While those familiar with "Oddities" will not experience the novelty felt when reading that book, they will find in "Enigmas" a collection of curious happenings, all well authenticated historically, but all lacking adequate explanation. Some of the subjects treated are: strange sounds, such as the cry of the Egyptian statue of Memnon; extraordinary cases of longevity, like "Old Parr"; the straits of Anian; the landfall of Columbus and the canals of Mars. The author holds no brief for any of the explanations that he discusses, he merely presents the facts and leaves it to the reader to judge for himself. So interesting are the first two books by Commander Gould that one hopes the other curious works he is writing will soon appear.

General Science
Science News-Letter, January 4, 1930

MECHANICS OF THE GYROSCOPE—Richard F. Deimel—(Engineering Science Series)—*Macmillan*—($4). The "brain" of many of the robots of our mechanical civilization consists of a spinning top. This technical treatise deals comprehensively with the dynamics of rotation and it is an explanation of the mechanical principles underlying the gyroscope in its many applications.

Mechanics
Science News-Letter, January 4, 1930

HONDURAN MOSSES COLLECTED BY PAUL C. STANDLEY—Edwin B. Bartram—*Field Museum*. A pamphlet of interest to bryologists and systematic botanists generally.

Botany
Science News-Letter, January 4, 1930

RADIAL VELOCITIES OF 500 STARS OF SPECTRAL CLASS A—Edwin B. Frost, Storrs B. Barrett & Otto Struve—*University of Chicago Press* ($1.50). The results of 28 years spectrographic work at the Yerkes Observatory in determining how rapidly these stars are approaching or receding from the earth. Early in the scheme of stellar evolution, with faint and diffuse spectral lines, the A class are particularly difficult to measure in this way, and the work represents a real achievement.

Astronomy
Science News-Letter, January 4, 1930

CHEMISTRY IN DAILY LIFE—Samuel Glasstone—*Dutton*—($2.25). Of British origin, this book will satisfy the needs of those who read for information rather than entertainment. It is typically British in that it contains a surprising amount of information compactly presented in readable rather than enticing form.

Chemistry
Science News-Letter, January 4, 1930

AMUNDSEN—THE SPLENDID NORSEMAN — Bellamy Partridge — *Stokes* ($2.50). The great epical explorer of all times is the subject of this illuminating biography.

Exploration—Biography
Science News-Letter, January 4, 1930

TRANSPORTATION GLOSSARY—H. G. Brady—*Simmons-Boardman* ($1.75). A supplement to the dictionary to explain the technical terms in the broad field of transportation.

Transportation
Science News-Letter, January 4, 1930

THE UNITED STATES AND THE WORLD COURT—Philip C. Jessup—*World Peace Foundation* ($2). The history of the American attitude and action toward the World Court compiled by a Columbia University professor.

Sociology
Science News-Letter, January 4, 1930

TRANSPORT AVIATION — Archibald Black—*Simmons-Boardman*—($5). A second and new edition of a handbook of the aviation business which will undoubtedly prove of real value to those in this industrial field.

Aviation
Science News-Letter, January 4, 1930

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LINDBERGH FLIES ON!—Earl Reeves—*McBride* ($2). A story that starts with Lindbergh and includes the colorful leaders in the building of America's air empire.

Aviation
Science News-Letter, January 4, 1930

DANCE OF THE MACHINES—Edward J. O'Brien—*Macaulay* ($2.50). The machine incarnate visualized as the great standardizer and destroyer of individual American genius today is blamed upon the decadence of the American short story.

Literature
Science News-Letter, January 4, 1930

DAVID LIVINGSTONE—G. E. Mitton—*Black, London* (2/, about 60c). One of the attractive little volumes in the series entitled "Peeps at Great Explorers." It emphasizes Livingstone's experiences as an explorer rather than as a missionary. A number of the illustrations are in color.

Exploration
Science News-Letter, January 4, 1930

THE FIELD MUSEUM — OXFORD UNIVERSITY EXPEDITION TO KISH, MESOPOTAMIA, 1923-1929 — Henry Field—*Field Museum* (50c). An illuminating booklet giving the gist of some of the most important of modern archaeological explorations in the Near East.

Archæology
Science News-Letter, January 4, 1930

Brief Science Notes

A new and promising insecticide is rotenone, a crystalline material which is both a contact and stomach poison, now obtained chiefly from foreign plants.

American plant growers have so improved the Japanese chrysanthemum that Japan now looks to America for the newest varieties.

It has only recently been demonstrated that Easter lilies may be grown in almost every part of the United States and even in Canada, if properly protected.

The mummy of one of the Egyptian pharaohs shows that he had a typical club foot.

There are more than 19,000 doctors in the United States who practise as specialists only.

IN VARIOUS SCIENCE FIELDS

Eurypterids

The old joke about the museum that claimed to have the skull of Oliver Cromwell as an old man, and also his skull as a young boy, is not necessarily a joke when it comes to one-time living beings of a date much more remote than that of Oliver Cromwell.

How this paradox may come to pass will be explained shortly in a report to the American Paleontological Society by Joseph W. Monahan, presenting the results of his detective work on corpses dead a good two hundred million years.

He will describe a number of new species of animals that he has discovered in the Bertie Water Lime formation around Buffalo, New York, and will explain their significance as clues to the solution of certain mysteries of the ancient world.

The Bertie formation, which is widespread in New York state, is peculiar in that only a few kinds of animals have been preserved in it. But of the kinds preserved, a relatively large number of individuals are found. Other formations, crammed with the remains of other types of animals, never preserve the waterlime types, however. This is true especially of the scorpion-like creatures called Eurypterids.

Eurypterids, many of which reached a length of seven feet, are closely related to the oldest fossils known to science, and are related on the other hand to our present-day scorpions, spiders, and horseshoe crabs. Mr. Monahan believes that the large numbers of Eurypterids preserved is due to the fact that these animals probably shed their skins periodically, just as do the present-day spiders. Thus one Eurypterid might be responsible for a score of fossils.

Paleontology
Science News-Letter, January 4, 1930

Racing

Race horses and men follow the same physiological law in track events, and horses follow these laws more closely than men, is the conclusion reached by Prof. A. E. Kennelly, of the Harvard Engineering School, as told in an address before the American Association for the Advancement of Science..

Prof. Kennelly has studied all world records for horses trotting, pacing and running and for men swimming, walking, rowing, running and skating, and he finds that there are certain definite relations between the time, distance and speed of all events for both man and beast.

One application of what has been learned shows that if a man runs or a horse trots or uses any of the other gaits over two distances, the first twice as long as the second, 118 per cent. more time will be needed to cover the second distance than was required for the first.

Another of the laws shows how long an athlete may be expected to last before becoming exhausted if he increases or decreases his average speed. If his speed is raised one per cent., his running time is reduced nine per cent. Prof. Kennelly said he also found that if the speed of a record event is increased 20 per cent., the record distance corresponding to the new speed is four and three-tenths smaller than the first distance.

These and many other interesting facts learned apply to all the different gaits given above and to a slight extent to bicycling and automobiling. They are valuable both to the scientist and to the athlete and sportsman and point out, especially for the athlete and sportsman, the most vulnerable records, those that should be most easily broken.

The data for this study were secured by Prof. Kennelly from the *World Almanac*. Although he is an electrical engineer, he has made the determination of laws of fatigue of men and horses a hobby for a number of years, having published papers on the subject in 1906 and 1926.

Physiology
Science News-Letter, January 4, 1930

Submarine Peak

A submarine peak, sticking up into the Pacific Ocean 7,000 feet above the surrounding ocean bed, was discovered by the non-magnetic ship "Carnegie" on its cruise from Honolulu to Samoa, which ended fatally with the destruction of the ship and death of its commander, Capt. J. P. Ault, when the ship exploded in Apia harbor. Announcement of the discovery of the peak, to which no name has yet been given, was made by Dr. J. A. Fleming, acting director of the Carnegie Institution's Department of Terrestrial Magnetism, owners of the vessel. The new peak is at 25.6 degrees north latitude and 160.3 west longitude, a position about 300 miles northwest of Hawaii.

On the voyage last autumn from San Francisco to Honolulu a 9,800-foot peak was discovered at 32.4 degrees north and 127.8 degrees west, a few hundred miles off Santa Barbara, Calif. This has been named Hayes Peak, after Dr. Harvey C. Hayes, of the Naval Research Laboratory in Washington, inventor of the sonic depth finder with which these discoveries were made.

Other prominent submarine features discovered by the Carnegie since leaving Washington in May, 1928, are: Merriam Ridge, 9,800 feet high, about 1,000 miles off the coast of Chile, named after Dr. John C. Merriam, president of the Carnegie Institution of Washington; Bauer Deep, 17,700 feet deep, about 1,500 miles off the coast of Peru, named after Dr. Louis A. Bauer, founder and director of the Department of Terrestrial Magnetism; Carnegie Ridge, 5,900 feet high, a few hundred miles off the coast of Ecuador; Fleming Deep, 28,400 feet deep, about 800 miles south of Tokyo, named after Dr. Fleming; and an unnamed ridge 6,600 feet high near Tahiti.

Oceanography
Science News-Letter, January 4, 1930

Cursed Tomb

The strange, forbidding inscription recently discovered on an ancient tomb in Corinth was explained to the Society of Biblical Literature and Exegesis by Prof. George S. Duncan of American University, who discussed the newest contributions which archæology has made to knowledge of the Bible.

The inscription, found by Prof. T. L. Shear on the tombstone of a lady named Makedonia, stated in Greek that "if any opens her grave, the curse of Annas and Caiaphas shall be visited upon him." Annas and Caiaphas were the two high priests before whom Jesus was tried. The curse seems to refer to the fate of these characters, Prof. Duncan said, for in the Apochryphal New Testament it is stated that Annas and Caiaphas were among several others who were arrested. On the way to Rome, Caiaphas died in Crete, but the account states that the earth would not receive his body and he was covered with a cairn of stones. Annas' fate was to be sewed into a fresh bull's hide which, contracting as it dried, squeezed him to death.

Archæology
Science News-Letter, January 4, 1930

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